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H-2A Guest-Workers Program

ADOPTION AND USAGE BY SOUTHEASTERN GROWERS

Skyler Simnitt (University of Florida)
Derek Farnsworth (University of Florida)
Gulcan Onel (University of Florida)
Fritz Roka (University of Florida)

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RESEARCH QUESTIONS

- Why are U.S. farmers using the H-2A guest-workers program at such widely different rates?
- Is there a pattern to diffusion of the program across Southeast U.S. counties?
- Is there a contagion effect?

BACKGROUND

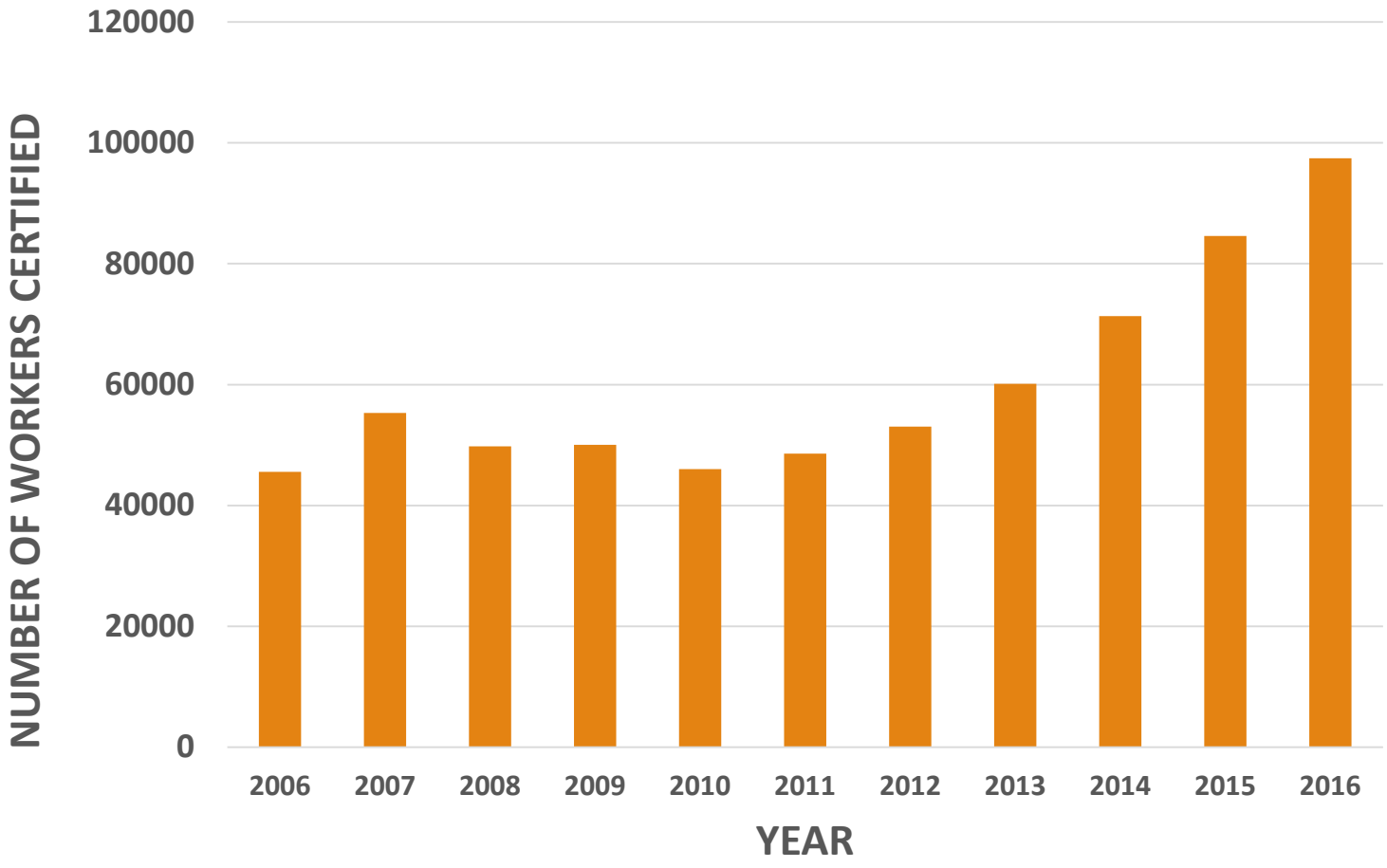
- U.S. farmers still dependent on labor
- Specialty crops.
  - fresh fruits and vegetables
  - landscape and horticulture
- Ranching/herding

BACKGROUND

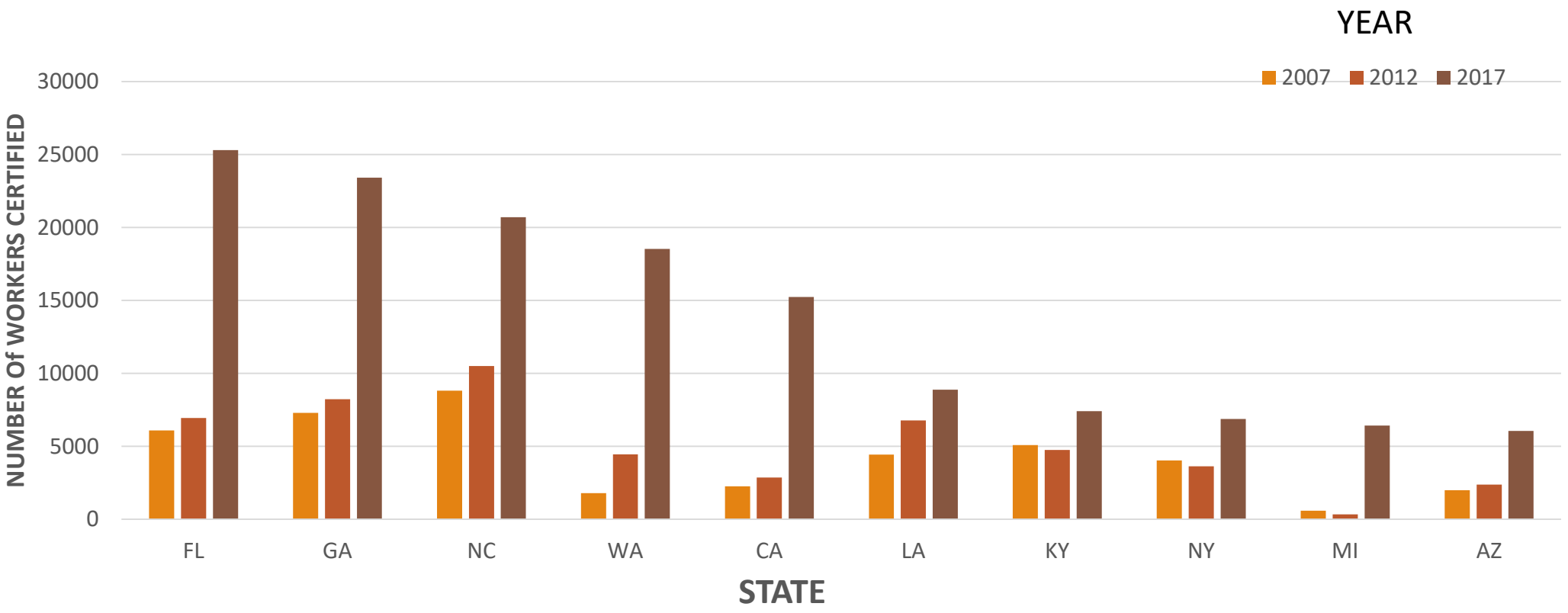
- Labor shortages are a pressing issue
  - Declining migration from Mexico
  - Occupational migration out of agriculture (Barkley:1990)
- The number of H-2A positions certified by the U.S. department of labor increased every year since 2011, overall increase of 81% between 2011 and 2015 (OFLC, 2016)
- Widely different participation rates across states

https://www.fb.org/viewpoints/farm-labor-shortage-affects-more-than-u.s
http://www.capitalpress.com/Opinion/Editorials/20170601/agriculture-copes-with-a-growing-labor-shortage

Total Workers Certified
(United States Southeast)



Top 10 Visa Requesting States
(Entire United States)



H-2A Guest-workers Program: Adoption and Usage by Southeastern Growers

- Why are U.S. farmers using the H-2A guest-workers program at such widely different rates?
- Is there a pattern to diffusion of the program across Southeastern U.S. counties?
- Is there a contagion effect?

METHODS (DATA)

Spatially weighted panel data

- Individual unit of observation (Southeast U.S. counties)
- Time period spans 11 years (2006-2016)
- Control for spatial relationships with a spatial weights matrix
  - Define neighbor as contiguous counties (all counties with a shared border)

Dependent Variable

- **Program usage** (number of workers certified), aggregated by county
- **Program adoption** (usage > 0, preceded by usage 0)

METHODS (DATA)

Why only analyze data for the Southeastern U.S.?

- Accessibility of data
- Time constraints

Why disaggregate usage and adoption data at county level instead of individual firm level?

- Interested in program usage by end users (farmers) not FLCs (farm labor contractors)
- Unique addresses provided for all firms requesting H-2A visas, however a significant portion of these are FLCs not the end users themselves.
- Worksite (farm) location only provided at city/county level

METHODS (DATA)

Demographic variables

- % unemployment (disaggregated by county) — *U.S. Bureau of Labor Statistics*
- % Hispanic population (disaggregated by county) — *U.S. Census Bureau*
- % annual average weekly wages (disaggregated by county) — *U.S. Bureau of Labor Statistics*

- **Production variables**
  - Acres harvested (blueberries, strawberries) — *U.S. Census Bureau*
  - Acres bearing (avocados, apples, citrus, grapes, peaches) — *U.S. Census Bureau*
  - Acres harvested (vegetables: 34 different varieties e.g. asparagus, beans, beats, broccoli, cabbage, carrots, cauliflower etc.) — *U.S. Census Bureau*

METHODS (DATA)

- Agricultural production data only available for Census years 2002, 2007 and 2012
- Estimated for missing years by using beta-within regression
- $Y_{it} = X_{it}\beta + \alpha_i + u_{it},$
- Y_{it} county level production of the given crop at time t,
- α_i time-invariant individual effects,
- X_{it} a 1×2 matrix of the regressors (state-production and year),
- β parameter estimates,
- u_{it} error term

METHODS
Test for Spatial Auto-correlation with Moran's I

Moran's I (introduced by P.A.P Moran 1950)

- *Is there spatial auto-correlation?*

$$I = \frac{n}{W} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{(x_i - \bar{x})^2}$$

- n number of observations,
- w_{ij} is the matrix of spatial weights,
- x_i is the variable of interest for observation *i*,
- $\bar{x}$ is the sample mean of the variable of interest,
- and W is the sum of all the weights.

- Global Moran's I (entire sample)
- Local Moran's I (computed for each node/individual)
- Computed Using Geoda (software)

METHODS

Spatial Autoregressive Model (modeling program usage)

$$y_{it} = \lambda \sum w_{ij} y_{jt} + x_{it}\beta + \varepsilon_{it}$$

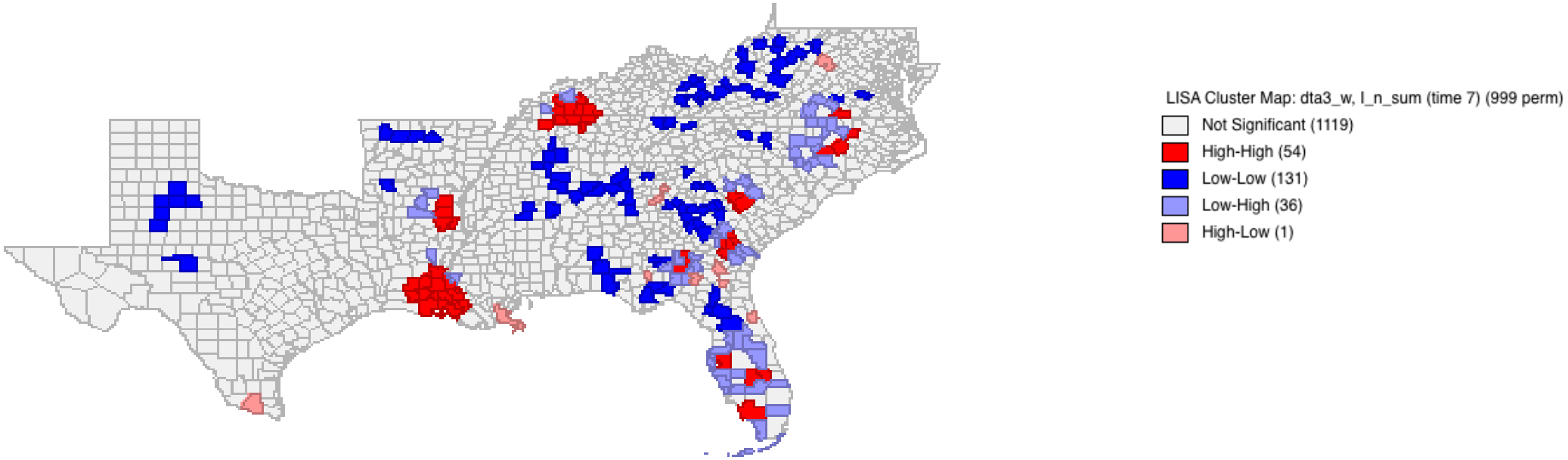
- y_{it} individual $i's$ usage level at time t
- w_{ij} spatial weights matrix
- λ spatial autoregressive coefficient,
- μ_i are the individual fixed effects,
- x_{it} combination of factors (demographic data, production data)
- ε_{it} , an error term that includes the spatial autocorrelation coefficient

METHODS
hazard model (modeling program adoption)

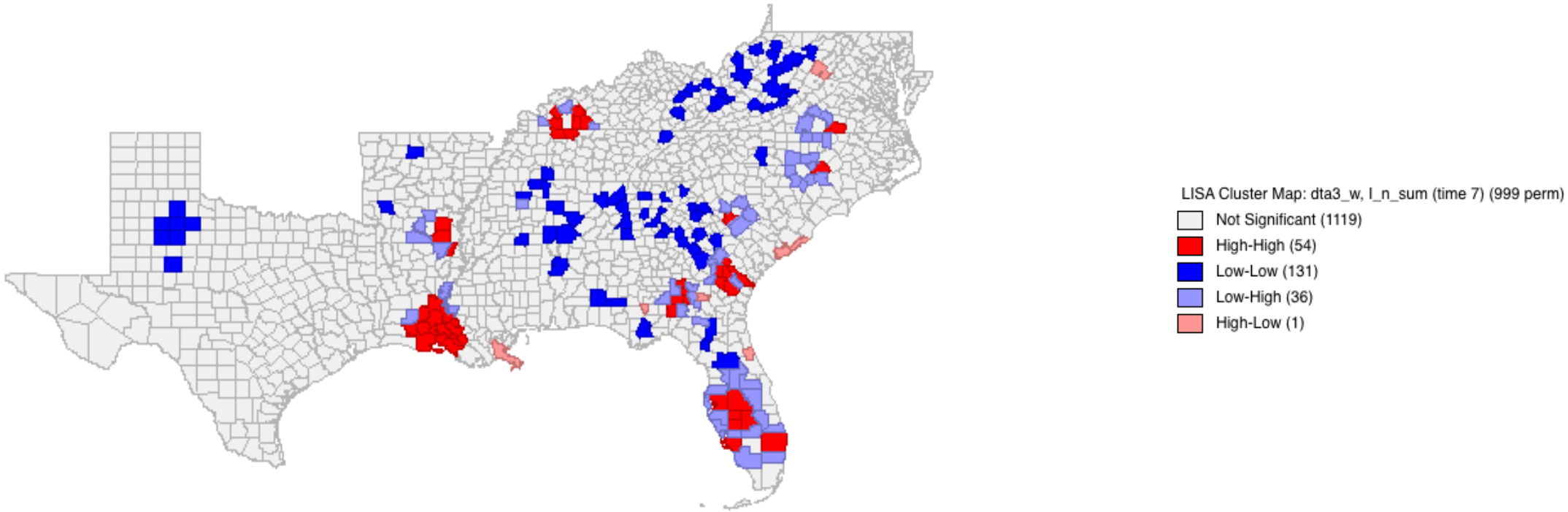
$$\eta_{ijt} = \sum w_{ij}\lambda_{it-1} + x'_{it}\beta + \gamma_t + \varepsilon_{it}$$

- η_{ij} utility individual i gets from choosing option j, $j = \begin{cases} 1, if\ adopted \\ 0, otherwise \end{cases}$
- $\Pr(of\ i\ choosing\ j) = \pi_{ij} = \frac{\exp(\eta_{ij})}{\sum \exp(\eta_{ik})}$
- $\sum w_{ij}\lambda_{it-1}$ lagged exposure (proportion of neighbors using the program in period $t-1$)
- x_{it} a combination of factors (demographic data, production data)
- γ_t time effects
- ε_{it} error term

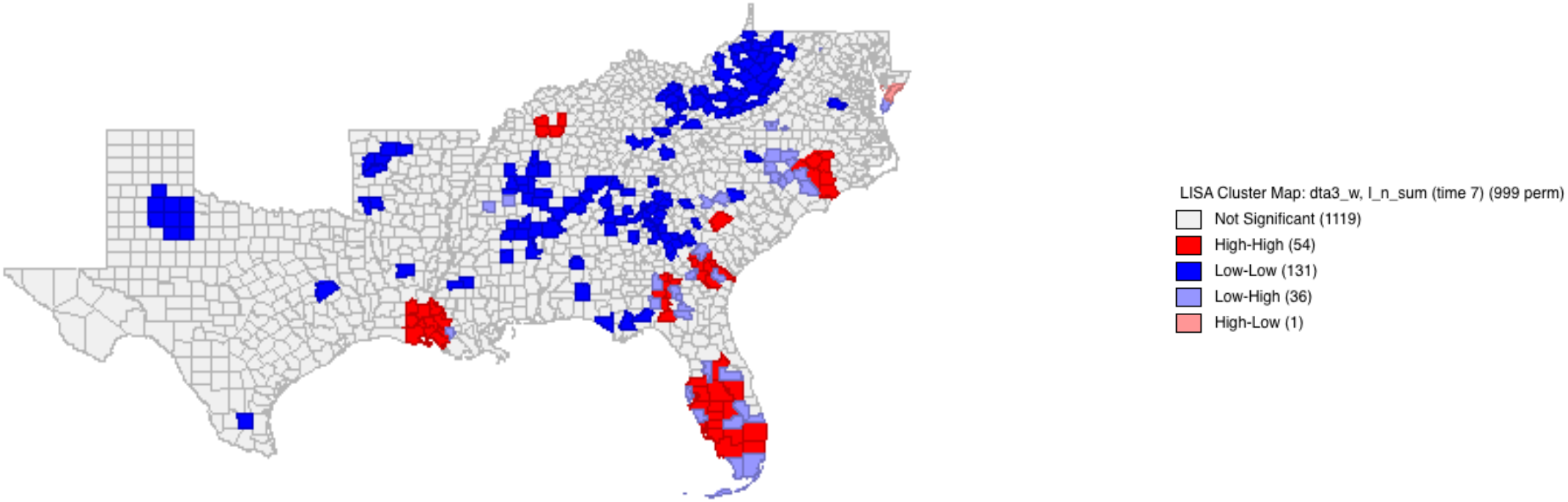
RESULTS
Local Moran's I significance clustering (usage 2009)



RESULTS
Local Moran's I significance clustering (usage 2012)



RESULTS
Local Moran's I significance clustering (usage 2015)



H-2A Program Usage Levels in Southeast U.S. Counties (Spatial Autoregressive Model)

Variable	Estimate	Std. Error	
ρ (spatial auto-correlation)	-0.659	0.029	***
λ(spatial-lagged coefficient)	0.645	0.016	***
unemployment-rate	-0.961	0.240	***
Hispanic % of pop.	2.809	0.800	***
production (avocados bearing-acres)	0.066	0.037	*
production (citrus bearing-acres)	-0.088	0.007	***
production (blueberries acres harvested)	0.386	0.074	***
production (strawberries acres harvested)	-0.339	0.117	**

*** sign. P-value≦0.001
** sign. P-value≦0.05
* sign. P-value≦0.1

Insignificant variables not reported: av. weekly wage-rate, production (apples, grapes, peaches)

H-2A program adoption in Southeast U.S. Counties (Hazard model)

Variable	Estimate	Std. Error
(Intercept)	0.650	0.368 *
l.exposure ($\lambda \sum w_{ij} y_{jt}$)	0.557	0.280 **
Unemployment-rate	0.057	0.028 **
av. weekly wage	-0.001	0.000 *
production (blueberries bearing acres)	0.013	0.006 **
production (avocados bearing acres)	0.000	0.000 *
production (apples bearing acres)	-0.003	0.001 ***
production (grapes bearing acres)	0.000	0.000 *
production (vegetables acres harvested)	0.000	0.000 **

*** sign. P-value≦0.001
** sign. P-value≦0.05
* sign. P-value≦0.1

Insignificant variables not reported: % Hispanic Population, production (strawberries, citrus, peaches)

FINDINGS (Usage Levels)

- Individual counties' usage levels are positively correlated with neighbors' usage levels
- Unemployment rate is negatively correlated with program usage levels.
  - Consistent with program goals. Agricultural producers use the program amid domestic labor shortages.

FINDINGS (Program Adoption)

Lagged exposure (% of one's neighbors who had adopted in previous period)

- Significant and positively correlated with program adoption
- Suggests a contagion effect exists

Unemployment rate

- positively correlated with program adoption
- Producers begin using the program despite relatively high unemployment
- Unemployment data is for all sectors including agriculture

Wages negatively correlated with the program adoption

CONCLUSION

We find evidence H-2A program users are being influenced by their neighbors' usage, in addition to production demands, and demographic variables (e.g unemployment rate).

Is their a pattern to diffusion across the U.S. Southeast?

- Yes (attested by significance of l.exposure in hazard model)

Reason for different usage rates across the country?

- Still unclear

Is there a contagion effect?

- Yes

What next?

- Show causality of neighbors' usage levels on own usage levels. (Possibly spatial Arellano-Bond model)
- Improve both models by including more explanatory variables (production, H-2A job-type, county population of agricultural workers)
- Consider other models: random effects, spatial-error model.
- Expand analysis to entire United States
- Disaggregate data by firm, rather than county.
  - Individual units of observation, agricultural firms.

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